REMARKS

Claims 1-30 are pending in this application. Claims 20-21 have been amended in several particulars for purposes of clarity and brevity that are unrelated to patentability and prior art rejections, while claims 25-30 have been newly added in accordance with current Office policy, to alternatively define Applicants' disclosed invention and to assist the Examiner to expedite compact prosecution of the instant application.

Claims 1-5, 7 and 14-21 have been rejected under 35 U.S.C. §102(e) as being anticipated by Alexander et al., U.S. Patent No. 6,151,684 for reasons stated on pages 2-3 of the Office action (Paper No. 3). Specifically, the Examiner asserts that Alexander '684 discloses,

> A host (Nodes 12 Col. 5 Ln. 54-67, Col. 6 Ln. 1-17), a Cluster Fabric (Cluster 10, "numeral 11..." Col. 5 Ln. 45-67, Col. 6 Ln 1-28), a Fabric-Attached I/O Controller (SCCI Controllers 22, I/O Controllers 28 Col. 5 Ln 54-67 "device ..." Col. 8 Ln 32-44), a Processor (CPU 36 Col. 5 Ln. 65-67), a Memory (Memory 38 Col. 5 Ln. 65-67), an Operating System (("TNC-enhanced operating system" Col 6 Ln. 6-28, UNIX operating system Col. 7 Ln. 57-67, Col. 8 Ln. 1-67), a I/O Bus Abstraction ("vproc layer ..." Col. 6 Ln. 35-45, "mechanism ..." Col. 8 Ln. 35-44, Col. 9 Ln. 5-14, "cspecfs mechanisms ..." Col. 10 Ln. 28-45) and a Target Fabric-Attached I/O Controller ("device..." Col. 8 Ln. 32-44).

The Examiner's assertion is incorrect, however. Applicants submit that the features of the present invention are not taught or suggested by Alexander '684. Therefore, Applicants respectfully traverse the rejection and request the Examiner to reconsider and withdraw this rejection for the following reasons.

Independent claims 1 and 16 define a host system, and a cluster including a host system to <u>report multiple paths to a target fabric-attached I/O controller, via a cluster</u>

5

fabric. Such a host system comprises a processor, a memory coupled to the processor; and an operating system (OS) provided with an I/O bus abstraction for the cluster fabric to report multiple paths to a target fabric-attached I/O controller.

Similarly, Beauregard claim 21 defines a computer usable medium having computer readable program code means embodied therein for use in a host system to report multiple paths to a target fabric-attached agent via a cluster fabric. The computer readable program code means comprises a fabric bus driver provided to create and report multiple paths to a target fabric-attached I/O controller via the cluster fabric; and a fabric adapter device driver provided to interface to the cluster fabric for enabling reporting the multiple paths to the target fabric-attached I/O controller.

As expressly defined in each of Applicants' base claims 1, 14 and 21, one of the key limitations is the ability of an operating system (OS) "to create and report multiple paths to a target fabric-attached I/O controller via the cluster fabric", an essential limitation that the Examiner has ignored in his assessment of Alexander '684.

In contrast to Applicants' claims 1, 16 and 29, Alexander '684 discloses nothing more than a system area network (SAN) shown in FIG. 1, including a number of CPUS 12A-12D, or nodes interconnected by the SAN to form a cluster 10 in which any node of the cluster has access to any I/O device 20 and 30. Generally in such a SAN, each CPU or node has controlling ownership of an I/O device. If the CPU or node fails for any reason, then resources available to the I/O device are lost, even though the I/O device is still functional. Therefore, the purpose of Alexander '684 is to ensure

> "that, when a CPU or node having controlling ownership of an I/O device fails, that failure does not cause the I/O device, or the resources the I/O device provides, to also be lost as has been the situation in the past." See column 4, lines 54-58 of Alexander '684.

6

According to Alexander '684, one of the CPUs in the cluster 10 is designated as a device ownership information service (DOIS) server node to serve as a keeper of a device ownership information table as shown in FIG. 2. Such a device ownership information table as shown in FIG. 2 contains details of the "ownership" of each I/O device, i.e., "which CPU has the necessary driver(s) to control the I/O device, and what other CPU in the cluster also has such driver(s) to control the I/O device in the event the "present" owner CPU should fail." This way, should a CPU or node controlling a particular I/O device fails, that failure will be detected by the DOIS server node, which will then take steps to flush all references to the I/O device(s) owned by the failed CPU or node, and attempt to re-establish ownership of the I/O device by another CPU or node in the cluster having the necessary driver(s) to control the I/O device. The device ownership table is then revised to reflect the I/O device's new owner.

In other words, if a CPU or node having ownership over a particular I/O device fails, then the DOIS server node will establish ownership of that particular I/O device with another CPU or node in the cluster.

However, there is **no** disclosure or suggestion anywhere in the cited portion or anywhere else in Alexander '684 of Applicants' ability of an operating system (OS) "to create and report multiple paths to a target fabric-attached I/O controller via the cluster fabric", as expressly defined in each independent claims 1 and. Certainly, there is no disclosure anywhere in Alexander '684 of Applicants' claimed "**fabric bus driver** provided to create and report multiple paths to a target fabric-attached I/O controller via the cluster fabric" and "**fabric adapter device driver** provided to interface to the cluster

7

fabric <u>for enabling reporting the multiple paths to the target fabric-attached I/O controller</u>" as expressly defined in Applicants' Beauregard claim 21.

The rule under 35 U.S.C. §102 is well settled that anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. <u>In re Paulsen</u>, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); <u>In re Spada</u>, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Those elements must either be inherent or disclosed expressly and must be arranged as in the claim. <u>Richardson v. Suzuki Motor Co.</u>, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989); <u>Constant v. Advanced Micro-Devices, Inc.</u>, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); <u>Verdegaall Bros., Inc. v. Union Oil Co.</u>, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987). The corollary of that rule is that absence from the reference of any claimed element negates anticipation. <u>Kloster Speedsteel AB v. Crucible Inc.</u>, 793 F.2d 1565, 230 USPQ2d 81 (Fed. Cir. 1986).

In the present situation, Alexander '684 '744 fails to disclose and suggest Applicants' claims 1, 14 and 21. Therefore, Applicants respectfully request that the rejection of claims 1, 14 and 21 and their respective dependent claims be withdrawn.

Claims 9-13, 22 and 23 have been rejected under 35 U.S.C. §103 as being unpatentable over Alexander et al., U.S. Patent No. 6,151,684, as modified to incorporate selected features from what the Examiner alleges as "Applicant's prior art" (APA) see page 13 of Applicants' specification, for reasons stated on pages 4-5 of the Office Action (Paper No. 3).

Notwithstanding the Examiner's reliance upon Alexander '684 is incorrect, as demonstrated for reasons traversed against the rejection of claims 1-5 and 14-21 under

35 U.S.C. §102(e), the Examiner's allegation of "Applicant's prior art (APA)" on page 13 of Applicants' specification is entirely flawed. Applicants respectfully submit that features of claims 9-13, 22 and 23 are not taught or suggested by Alexander '684 or what the Examiner incorrectly alleges as "applicant's prior art", whether taken individually or in combination with any other references of record. Therefore, Applicants traverse the rejection and request the Examiner to reconsider and withdraw this rejection for the following reasons.

First of all, page 13, line 1 of Applicants' specification refers to one example embodiment of Applicants' disclosed invention, and **not** what the Examiner alleges as Applicants' prior art. Specifically, page 12, line 20 extending to page 13, line 1 of Applicants' specification describes,

> "According to an example embodiment, the host operating system (OS) 600 may be Windows 2000, and the I/O manager 507 may be a Plug-n-Play manager."

As described on page 12, line 20 extending to page 13, line 1 of Applicants' specification, no where is there an admission of any prior art that can be used against Applicants' claims 9-13, 22 and 23.

Secondly, Applicants' base claim 9 defines the specific of an operating system (OS) for use in a host system coupled to a cluster fabric including one or more I/O controllers. For example, the operating system (OS) of Applicants' claim 9 includes a kernel; an **I/O manager** operatively coupled to the kernel; one or more **I/O controller drivers** operatively coupled to the kernel, each controller driver specific for a specific type of I/O controller; and a **fabric bus driver** operatively coupled to the I/O manager to

provide <u>an I/O bus abstraction to the I/O manager for the cluster fabric to report multiple</u>

<u>paths to a target fabric-attached I/O controller</u>.

Again, for reasons discussed against the rejection of claims 1-5, 7 and 14-21

under 35 U.S.C. §102(e), Alexander '684 only discloses the use of a designated DOIS

server node configured to establish ownership of a particular I/O device with another

CPU or node in a cluster, if a rightful owner, i.e., CPU or node having ownership over

the same I/O device fails. There is **no** disclosure anywhere from Alexander '684 of

Applicants' claimed specifics of the operating system (OS) that is able to provide <u>an I/O</u>

<u>bus abstraction to the I/O manager for the cluster fabric to report multiple paths to a</u>

<u>target fabric-attached I/O controller</u>.

Likewise, Applicants' base claim 22 defines a method of initializing a host to

report multiple paths to a target agent via a cluster fabric. Such a method comprises:

      loading an operating system kernel into a memory;
      loading an I/O manager into the memory;
      loading a local I/O bus driver and a fabric bus driver providing a
local I/O bus abstraction for the cluster fabric into the memory;
      enabling the local I/O bus driver <u>to identify any local I/O controllers</u>
<u>connected to a corresponding local I/O bus</u>;
      enabling the fabric bus driver <u>to identify any fabric-attached I/O</u>
<u>controllers assigned to the host, and report the identified local I/O</u>
<u>controllers connected to the local I/O bus and the identified fabric-</u>
<u>attached I/O controllers to the I/O manager</u>;
      loading an I/O controller driver into the memory for each reported
I/O controller; and
      enabling the fabric bus driver <u>to create and report multiple paths to</u>
<u>a target fabric-attached I/O controller via the cluster fabric</u>.

Again, there is **no** disclosure anywhere from Alexander '684, and the Examiner

has **not** provided any reference to any specific portion of Alexander '684 for disclosing

Applicants' claimed specific method of initializing a host to report multiple paths to a target agent via a cluster fabric, as expressly defined in Applicants' base claim 22.

The law under 35 U.S.C. §103 is well settled. In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) <u>must teach or suggest all the claim limitations</u>. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and **not** based on Applicants' disclosure. <u>In re Vaeck</u>, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP 2143. In other words, all the claim limitations must be taught or suggested by the prior art. <u>In re Royka</u>, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." <u>In re Wilson</u>, 424 F.2d 1382, 1385, 165 USQP 494, 496 (CCPA 1970).

In the present situation, the Examiner has misinterpreted the teachings of Alexander '684, incorrectly alleged that page 13, line 1 of Applicants' specification refers to "prior art", ignored to treat Applicants' claim invention as a whole, failed to consider all the key limitations of Applicants' independent claims 9 and 22, and failed to provide any suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify what the Examiner alleges as "APA" into Alexander '684 in order to arrive at Applicants' claims 9-13, 22

and 23. Therefore, in view of these reasons, Applicants respectfully request that the rejection of claims 9-13, 22 and 23 be withdrawn.

Lastly, claims 6, 8 and 24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Alexander et al., U.S. Patent No. 6,151,684, as modified to incorporate selected features from what the Examiner alleges as "Applicant's prior art" (APA) see page 13 of Applicants' specification, as applied to claim 22, and further in view of Chow, U.S. Patent No. 6,148,349 for reasons stated on pages 5-6 of the Office Action (Paper No. 3). In support of this rejection, the Examiner further cites column 13, lines 54-61 of Chow '349 for allegedly disclosing "creating one instance of an I/O controller driver stack".

Again, notwithstanding the noted deficiencies inherent with Alexander '684 and what the Examiner alleges as "APA", the cited column 13, lines 54-61 of Chow '439 simply refers to External Interfaces and Protocols in which,

> All requests of ION Physical disk driver subsystem 500 are made through the Common high level driver 502: a) Initialization (cs_init) A single cal into the subsystem performs all initialization required to prepare a device for I/Os. During the subsystem initialization, all driver structures are allocated and initialized as well as any device or adapter hardware.

Again, nowhere in the cited column 13, lines 54-61 of Chow '349 is there any reference to Applicants' claimed "fabric bus driver" to "create a separate device object for each port of the host-fabric adapter that can be used to communicate with the target fabric-attached I/O controller and establish the multiple paths to the target fabric-attached I/O controller" as defined in claim 6.

Moreover, there is **no** disclosure anywhere from the Examiner's proposed combination of Alexander '684, the alleged "APA" and Chow '349, and the Examiner

12

has **not** provided any reference to any specific portion of Chow '349 for disclosing Applicants' claimed specific method of initializing a host to report multiple paths to a target agent via a cluster fabric, as expressly defined in Applicants' base claim 24.

Therefore, in view of these reasons and other reasons as discussed previously, Applicants respectfully request that the rejection of claims 6, 8 and 24 be withdrawn.

Claims 25-30 have been newly added to alternatively define Applicants' disclosed invention over the prior art of record. These claims are believed to be allowable at least for the same reasons discussed against all the outstanding rejections of the instant application.

In view of the foregoing amendments, arguments and remarks, all claims 1-30 are deemed to be allowable and this application is believed to be in condition to be passed to issue. Should any questions remain unresolved, the Examiner is requested to telephone Applicants' attorney at the Washington DC area office at (703) 312-6600.

INTERVIEW:

In the interest of expediting prosecution of the present application, Applicants respectfully request that an Examiner interview be scheduled and conducted. In accordance with such interview request, Applicants respectfully request that the Examiner, after review of the present Amendment, contact the undersigned local Washington, D.C. area attorney at the local Washington, D.C. telephone number (703) 312-6600 for scheduling an Examiner interview, or alternatively, refrain from issuing a further action in the above-identified application as the undersigned attorneys will be telephoning the Examiner shortly after the filing date of this Amendment in order to

schedule an Examiner interview. Applicants thank the Examiner in advance for such considerations. In the event that this Amendment, in and of itself, is sufficient to place the application in condition for allowance, no Examiner interview may be necessary.

Attached hereto is a marked-up version of the changes made to the claims. The attached page is captioned "**Version with markings to show changes made**."

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (Case No. 219.37639X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

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14

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 20-21 have been amended, and Claims 25-30 have been newly added, as follows:

1

2   20. (Amended)   The cluster as claimed in claim 14, wherein said fabric

3   manager comprises:

4   a-fabric services to detect the connection or presence of the target fabric-

5   attached I/O controller and to assign a network address to the target fabric-attached I/O

6   controller; and

7   an I/O controller manager coupled to the fabric services to assign the target

8   fabric-attached I/O controller to said host and to send messages to said host indicating

9   that the target fabric-attached I/O controller has been assigned.

1   21. (Amended)   A computer usable medium having computer readable

2   program code means embodied therein for use in a host system to report multiple paths

3   to a target fabric-attached agentI/O controller via a cluster fabric, said computer

4   readable program code means comprising:

5   a fabric bus driver provided to create and report multiple paths to a target fabric-

6   attached I/O controller via the cluster fabric; and

7   a fabric adapter device driver provided to interface to the cluster fabric for

8   enabling reporting the multiple paths to the target fabric-attached I/O controller.

15

1   --25.   A method of initializing a host to report multiple paths to a target fabric-

2   attached I/O device via a cluster fabric, comprising:

3   loading an operating system (OS) into a memory;

4   identifying all fabric-attached I/O devices assigned to the host;

5   reporting the identified fabric-attached I/O controllers; and

6   creating and reporting multiple paths to a target fabric-attached I/O device via the

7   cluster fabric.

1   26.   The method as claimed in claim 25, wherein the identified fabric-attached

2   I/O devices are reported, via a fabric bus driver included in the operating system (OS) to

3   provide a local I/O bus abstraction for the cluster fabric into the memory, using a

4   common set of procedures or commands.

1   27.   The method as claimed in claim 26, wherein the fabric bus driver is further

2   configured to create a separate device object for each port of the host that can be used

3   to communication with the target fabric-attached I/O device and establish the multiple

4   paths to the target fabric-attached I/O device, via the cluster fabric.

1   28.   The method as claimed in claim 26, wherein the multiple paths are utilized

2   for load balancing I/O requests and/or for fault tolerance when one or more paths to the

3   target fabric-attached I/O device fail.

1   29.   A method of initializing a host to report multiple paths to a target I/O

2   device via a cluster fabric, comprising:

3   loading a local I/O bus driver and a fabric bus driver providing a local I/O bus

4   abstraction for the cluster fabric into a memory;

5   identifying, using the local I/O bus driver, local I/O controllers connected to a

6   local I/O bus in the host; and

7   identifying, using the fabric bus driver, fabric-attached I/O devices assigned to

8   the host in order to determine multiple paths to a target fabric-attached I/O device, and

9   report all multiple paths to a target fabric-attached I/O device via the cluster fabric.

1   30.   The method as claimed in claim 29, wherein the multiple paths are utilized

2   for load balancing I/O requests and/or for fault tolerance when one or more paths to the

3   target fabric-attached I/O device fail.--